

FIG.4A

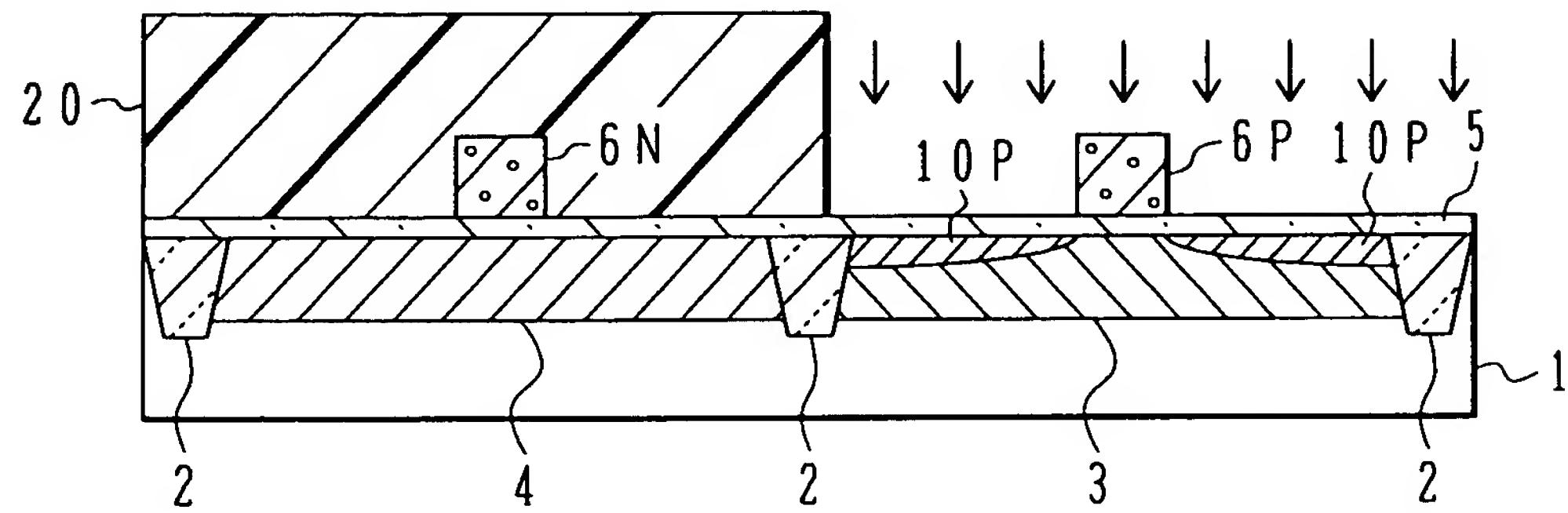


FIG.4B

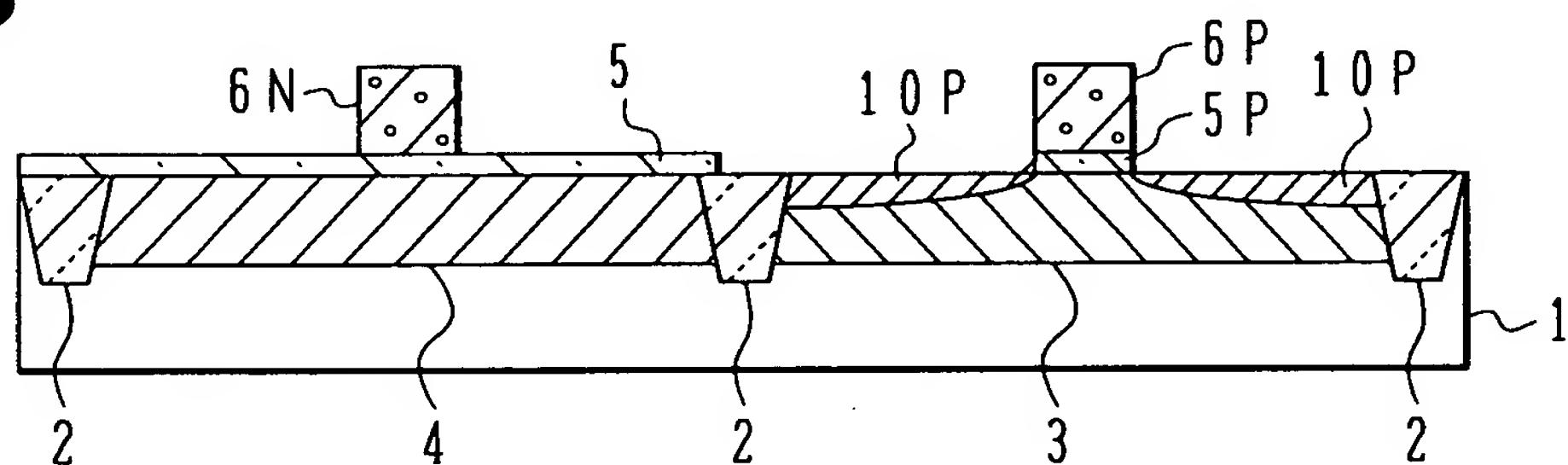


FIG.4C

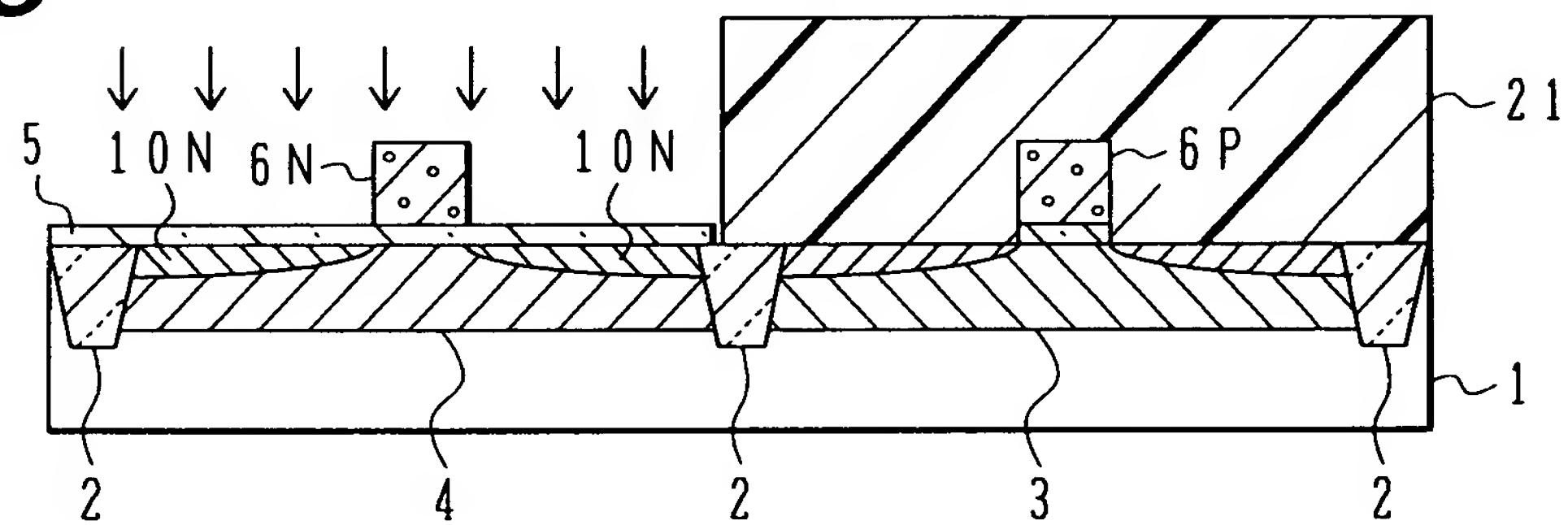


FIG.4D

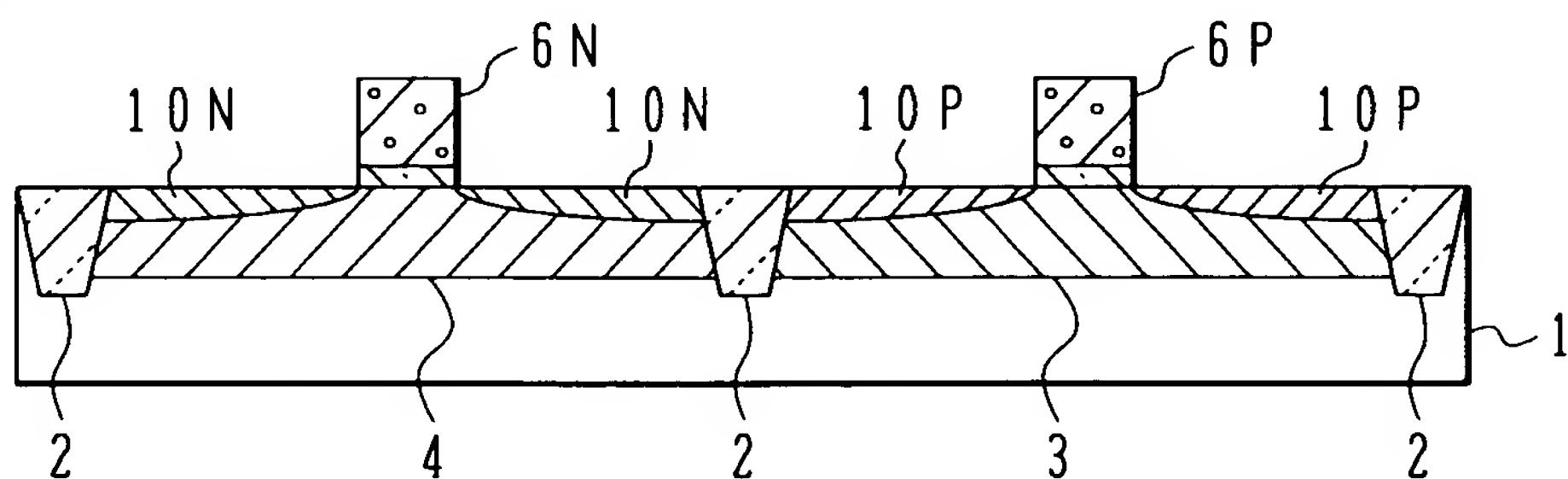


FIG.5

SAMPLE NO.	PLASMA	PLASMA TREATMENT TIME	SULFYLIC ACID TREATMENT TIME	Hf REMAINING AMOUNT (%)
1	NH ₃	30sec	135°C	BELOW DETECTION LIMIT
2	NH ₃	30sec	170°C	BELOW DETECTION LIMIT
3	Ar	10sec	135°C	6.17
4	Ar	10sec	170°C	BELOW DETECTION LIMIT
5	Ar	30sec	135°C	0.26
6	Ar	30sec	170°C	0.07
7	N ₂	30sec	135°C	BELOW DETECTION LIMIT
8	N ₂	30sec	170°C	BELOW DETECTION LIMIT
9	NONE	—	135°C	16.6
10	NONE	—	170°C	17.0

FIG. 1A

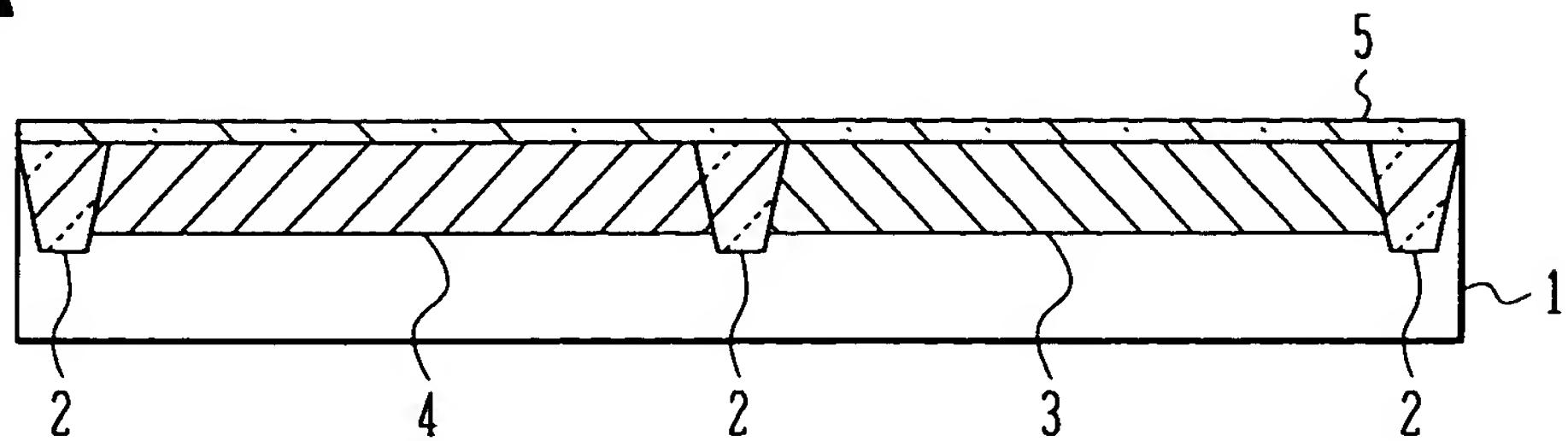


FIG. 1B

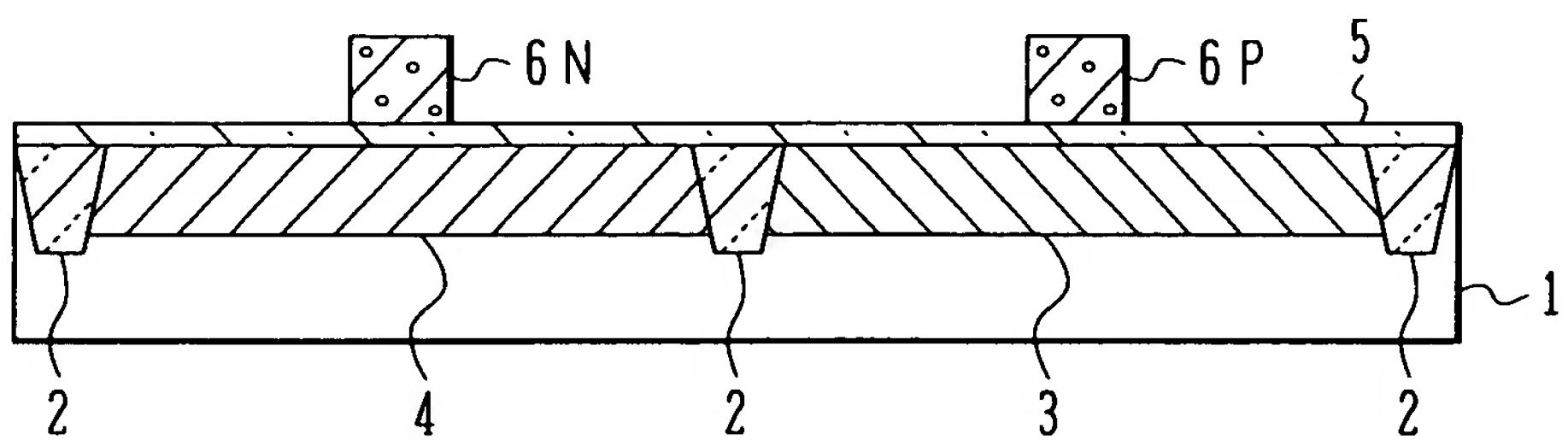


FIG. 1C

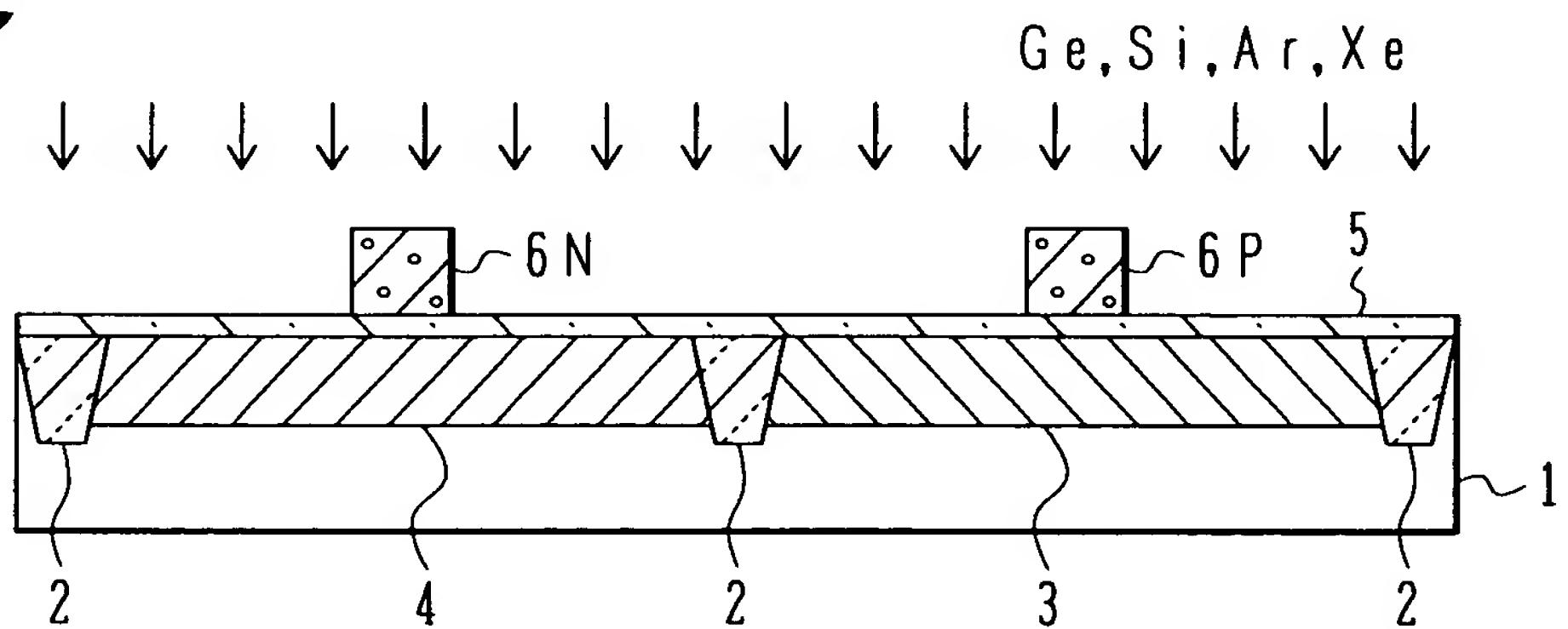


FIG. 1D

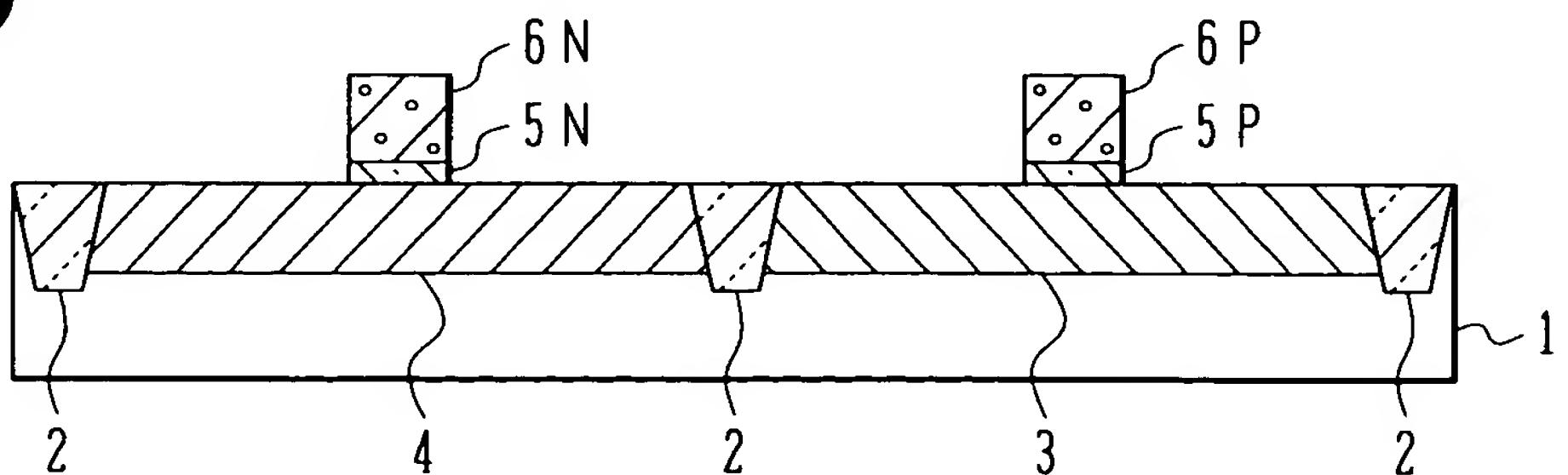


FIG. 1E

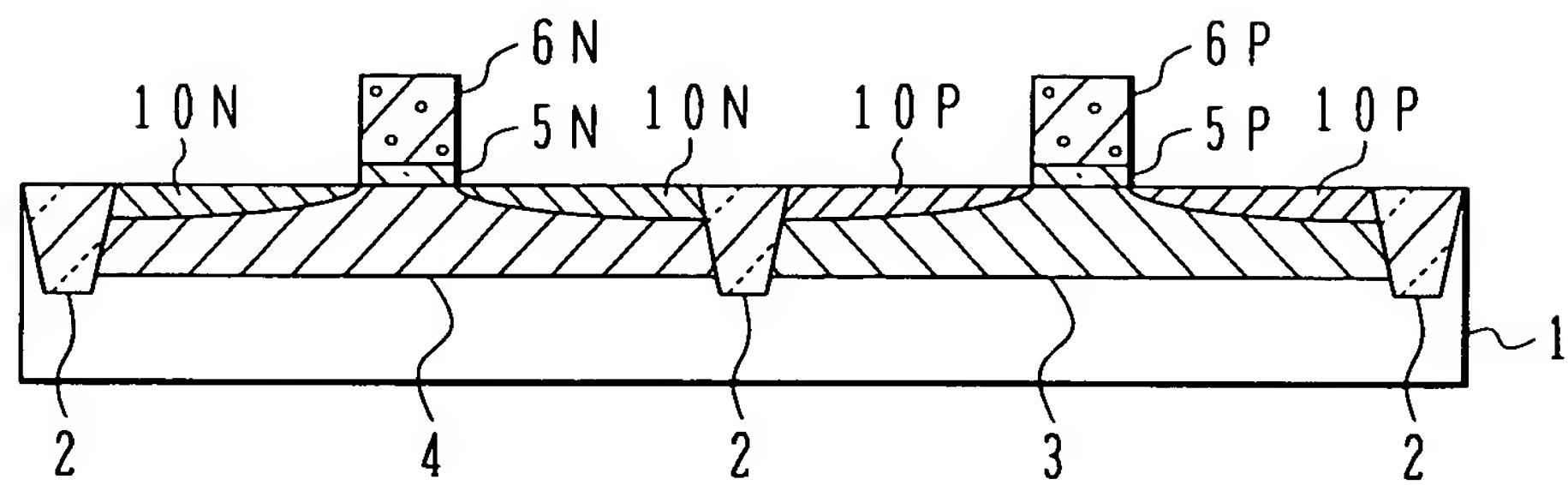


FIG. 1F

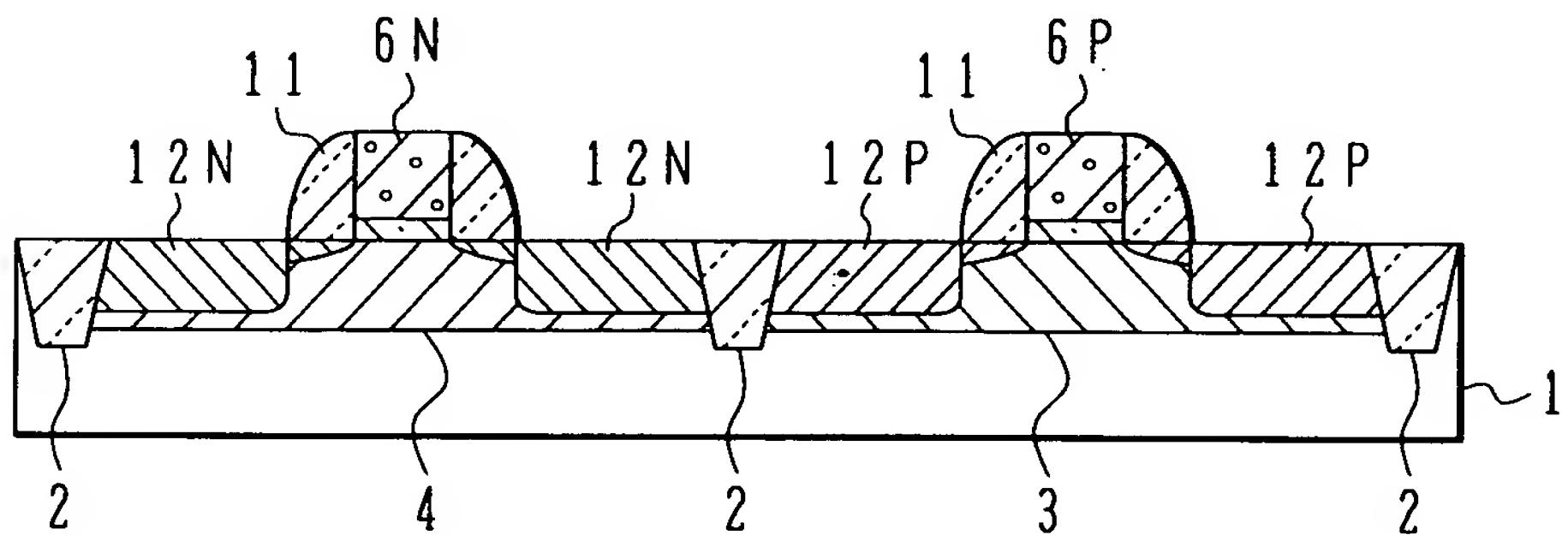


FIG. 1G

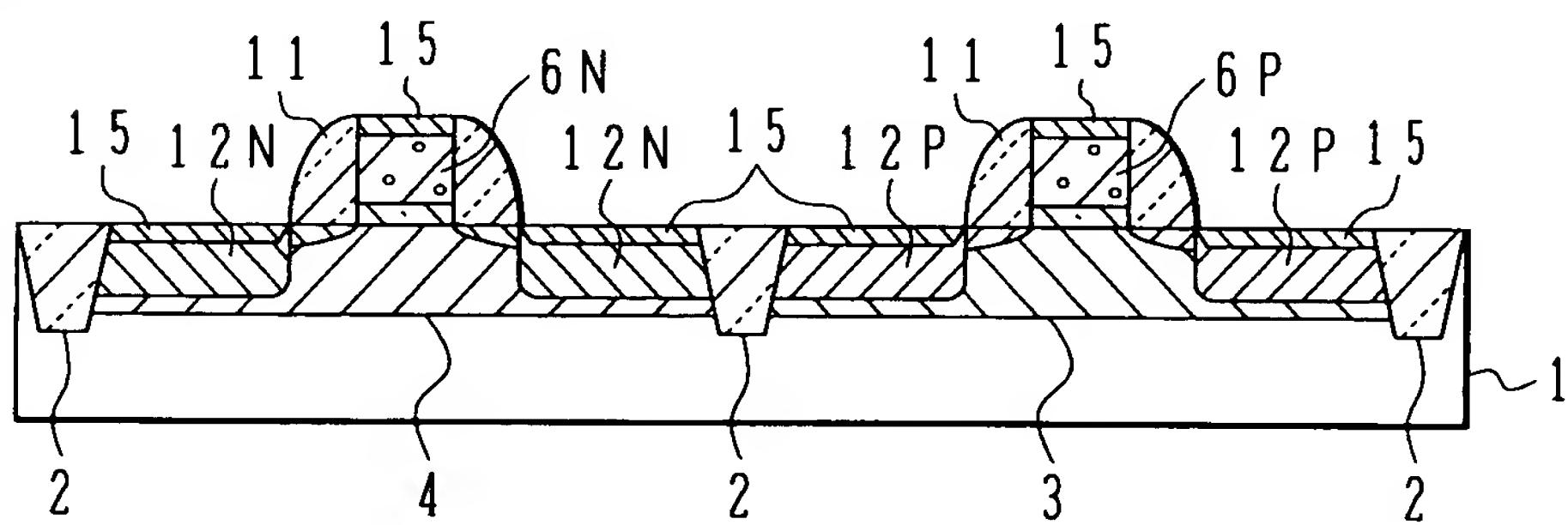


FIG.2

ETCHANT	TEMP.	AMORPHOUS ZrO ₂	CRYSTAL ZrO ₂	AMORPHOUS HfO ₂	CRYSTAL HfO ₂
H ₂ SO ₄ : H ₂ O ₂ = 4:1	150°C	0.1	0.03	2	0.01
H ₂ SO ₄ : H ₂ O ₂ = 4:1	130°C	0.03	HARDLY SOLUBLE	0.7	HARDLY SOLUBLE
H ₃ PO ₄ (conc.)	150°C	0.2	0.04	32	0.01
HCl : H ₂ O ₂ : H ₂ O = 1:2:10	80°C	HARDLY SOLUBLE	HARDLY SOLUBLE	HARDLY SOLUBLE	HARDLY SOLUBLE
NH ₄ OH : H ₂ O ₂ : H ₂ O = 1:2:10	80°C	0.01	HARDLY SOLUBLE	0.1	HARDLY SOLUBLE
HF : H ₂ O = 1:100	ROOM TEMP.	BELOW 0.1	HARDLY SOLUBLE	5.6	HARDLY SOLUBLE
HF : H ₂ O = 3:100	ROOM TEMP.	0.1	HARDLY SOLUBLE	18	HARDLY SOLUBLE
HF : H ₂ O = 1:10	ROOM TEMP.	0.5	0.007	47	0.003

FIG.3

